

REMARKS

Claims 1, 5, 6, 12, 21, 23, and 24 are amended and claims 25-35 are added by this amendment. Upon entry, claims 1-35 will be pending in this application.

The following remarks are responsive to the Office action dated August 5, 2004.

GENERAL CONSIDERATIONS

Doors used in mines are subject to large forces due, at least in part, to air flow in the mine and consequent air pressure differentials on opposite sides of the door. As a result, mine doors are typically designed to be robust to withstand peak air pressure differential. For example, a mine door leaf, which can be as large as 10 feet wide and 20 feet high, may weigh more than a thousand pounds when designed for a peak pressure differential of 7 inches water gauge (IWG), and over two thousand pounds when designed for a peak pressure differential of 20 IWG. As can be appreciated, a large force is required to move mine door leafs such as these between open and closed positions. Commonly, expensive, powerful door operating mechanisms are used for this task.

The present invention is directed to a mine door and stopping having a relief opening for relieving air pressure against the door to thereby facilitate powered operation of the door. The relief openings allow the air pressure differential on opposite sides of the mine door to be reduced. As a result, the door operating mechanisms can be sized smaller and thus, less costly than otherwise would be necessary to open the mine door leafs.

CLAIM 1

Amended claim 1 is directed to a mine door for installation in a passageway of a mine. The mine door comprises:

a leaf adapted to be mounted in the passageway for swinging between a closed position and an open position, the leaf having a first face facing in a direction in which it swings open and a

second face facing an opposite direction in which it swings closed,

said leaf being adapted for installation in the passageway where the leaf when closed is subject to a differential in air pressure involving higher pressure on one of said faces of the leaf than on the other of said faces of the leaf,

said leaf having an opening therein for passage of air therethrough from adjacent said one of said faces of the leaf to adjacent the other of said faces to more nearly equalize the pressure on said faces and thereby reduce the force required to open or close the leaf,

a closure mounted adjacent said opening and movable between a closed position blocking passage of air through said opening and an open position allowing passage of air, and

a first actuator mounted adjacent said closure for moving said closure between the open position and the closed position.

Claim 1 stands rejected under 35 U.S.C. 102(b) as being anticipated by GB 1,485,981 (Gallear). Claim 1, as amended, is patentable because the prior art references including Gallear fail to show or suggest a mine door including a first actuator **mounted adjacent a closure** for an opening in a mine door leaf for moving the closure between an open position and a closed position.

Gallear teaches aligning three sets of mine doors to maintain circulation of ventilation air in the proper direction (i.e., prevent short-circuiting of the mine air system) by allowing only one set of the three sets of doors to be open at any given time. As illustrated in Fig. 1, each set of mine doors includes a pair of mine door leafs 1 pivotally mounted to a bulwark 2 for movement between an open position and a closed position. In the closed position, each of the mine leafs 1 rest against a triangular top plate 5 and a spring loaded tread plate 8 thereby creating a V-formation. A pneumatic piston slidably mounted to the bulwark 2 above the triangular top plate 5 is

operable to move both of the leafs 1 simultaneously between the open and closed positions.

Each of the door leafs has a pressure relief door 12 that opens prior to the leafs opening to equalize the pressure on both sides of the bulwark 2. As described in column 2, lines 55-63, each of the pressure relief doors 12 are operated by a pneumatic cylinder controlled and supplied by a pneumatic system 13. While the pneumatic system 13 is shown in Fig. 1 as being mounted along the top of the bulwark 2 in the high pressure side of the mine passage, the pneumatic cylinders are not shown. Moreover, the location of the pneumatic cylinders is also not described in the specification. Thus, Gallear fails to teach a mine door including an actuator **mounted adjacent a closure** for moving the closure between an open position and a closed position, as recited in claim 1.

Because the structure of claim 1 is not shown or suggested by the prior art, claim 1 is submitted to be unanticipated by and patentable over the prior art of record including Gallear. Also, claims 2-11, which depend directly or indirectly from claim 1, are patentable for the same reasons as claim 1.

Claim 10 indirectly depends from claim 1 and further recites that the door frame is adapted for mounting a second leaf adjacent the first-mentioned leaf, respective **faces of the first and second leafs being substantially coplanar when the leafs are in the closed position.**

As described in more detail below with respect to claim 12, the mine door leafs 1 taught by Gallear rest against a triangular top plate 5 and a spring loaded tread plate 8 in the closed position. As a result, the mine door leafs 1 create a V-formation when closed. Accordingly, Gallear fails to teach a mine door having faces of the first and second leafs substantially coplanar when the leafs are in the closed position as recited in claim 10.

As a result, claim 10 is submitted to be unanticipated by and patentable over Gallear for these additional reasons.

Claim 11, which depends from claim 1, further recites that the leaf includes **a man door opening and a man door** mounted on the leaf for moving between a closed position for closing the man door opening and an open position for allowing personnel to pass through the man door opening, the closure being spaced from the man door.

As recognized by the Office in its obviousness rejection of claims 19 and 20, Gallear fails to teach a man door. Thus, claim 11 is submitted to be unanticipated by Gallear. Moreover, to the extent claim 11 corresponds to claim 19, it is submitted as patentable for the same reasons as claim 19.

CLAIM 12

Claim 12 is directed to a mine stopping system installed in a passageway of a mine for closing the passageway. The system comprises:

- a wall extending at least partway across the passageway,
- a door frame installed in or adjacent the wall to define a doorway to allow passage of machinery,
- a door leaf hinged on the door frame for swinging between a closed position in the doorway and an open position, the leaf having a first face facing in a direction in which it swings open and a second face facing an opposite direction, the leaf when closed being subject to a differential in air pressure involving higher pressure on one of said faces of the leaf than on the other of said faces, **said door leaf being substantially parallel with the door frame when the leaf is in the closed position,**
- an opening disposed in at least one of said leaf, wall and door frame for passage of air therethrough to more nearly equalize the pressure on said faces of the leaf and thereby reduce the force required to open or close the leaf, and
- a power-operated closure for said at least one opening movable between a closed position blocking passage of air and an open position allowing passage of air.

Claim 12 stands rejected under 35 U.S.C. 102(b) as being anticipated by Gallear. Claim 12, as amended, is patentable because the prior art references including Gallear fail to show or suggest a mine door including a door leaf substantially parallel with the door frame when the leaf is in the closed position and an opening disposed in the leaf.

Gallear, as illustrated in Fig. 1, teaches a mine door having a doorway and a pair of mine door leafs 1 pivotally mounted to a bulwark 2 for opening and closing the doorway. The doorway is defined by a door frame. The door frame is coplanar with the bulwark 2, which defines the right and left sides of the door frame. In the closed position, each of the mine leafs 1 rest against a triangular top plate 5 and a spring loaded tread plate 8 thereby creating a V-formation.

Moreover, Gallear teaches a pneumatic piston slidably mounted to the bulwark 2 above the triangular top plate 5 to move both of the leafs 1 simultaneously between the open and closed positions. The pneumatic piston, which is mounted parallel to the doorframe, would be unable to open or close the door leafs 1 if the door leafs were parallel with the door frame.

Thus, Gallear fails to teach or suggest a mine door including a door leaf substantially parallel with the door frame when the leaf is in the closed position as recited in claim 12.

Because the structure of claim 12 is not shown or suggested by the prior art, claim 12 is submitted to be unanticipated by and patentable over the prior art of record including Gallear. Also, claims 12-18, which depend directly or indirectly from claim 12, are patentable for the same reasons as claim 12.

Claim 14 depends directly from claim 12 and further recites that the opening is disposed in the wall. As illustrated in Fig. 1, Gallear teaches an opening formed in the door leafs 1, and not the bulwark 2. Accordingly, Gallear fails to teach an opening disposed in the wall as recited in claim 14.

As a result, claim 14 is submitted to be unanticipated by and patentable over Gallear for these additional reasons.

CLAIM 19

Claim 19 is directed to a mine door unit for installation in a passageway of a mine. The mine door unit comprises:

a door frame adapted to be installed in the passageway to define a doorway sized and shaped to allow passage of machinery,

a leaf hinged on the door frame for moving between a closed position for at least partially closing the doorway and an open position to permit passage of machinery through the doorway,

a man doorway in the leaf sized and shaped to allow passage of personnel,

a man door mounted on the leaf for closing the man doorway,
a pressure relief opening in the leaf and not in the man door, and

a closure mounted on the leaf for moving between a closed position for closing the pressure relief opening and an open position for relieving pressure against the leaf to facilitate opening of the leaf, the closure not being on the man door.

Claim 19 stands rejected under 35 U.S.C. 103(a) as being obvious in view of Gallear in combination with U.S. Patent No 6,425,820 (Kennedy). Claim 1, as amended, is patentable because the prior art references including Gallear fail to show or suggest a mine door including a man door and a pressure relief opening.

Gallear teaches aligning three sets of mine doors to maintain circulation of ventilation air in the proper direction (i.e., prevent short-circuiting of the mine air system) by allowing only one set of the three sets of doors to be open at any given time. A bulwark 2, in combination with a pair of mine leafs 1 positioned in a V-formation, forms a barrier that extends across a passageway in the mine thereby creating a pressure differential between opposite sides of the bulwark. Thus, one side of the bulwark 2 is a high pressure side and the other opposite side is a lower pressure side. Each of the door leafs has a pressure relief door 12 that open prior to the leafs opening to equalize the pressure on both sides of the bulwark 2.

Pressure equalization between sets of doors is taught in Gallear to prevent trapping or injuring persons passing through the door system in the event someone else would force the leafs of an adjacent set of door open. Without equalizing the pressure between sets of doors, opening the door leafs 1 mounted on the high pressure side of the airlock system may cause any open door leafs mounted on the adjacent low pressure side to slam shut thereby potentially injuring or trapping anyone in the process of passing through the door.

Kennedy discloses, as illustrated in Figs. 1 and 2, a mine door system 10 for erecting in a mine passageway 14 having a high pressure side 16 and a low pressure side 18. The mine door system 10 includes a pair of doors 20, 22 spaced apart along the mine passageway 14. Each door 20, 22 includes two leafs 60 (designated 60A, B for door 20 and 60C, D for door 22 for clarity) hingedly mounted for selective movement by a hydraulic system 89 between open and closed positions. The movement of each door 20, 22 is managed by a control system. A supplemental man door 64 can be hingedly mounted on one or more of the leafs 60 to provide for ingress to and egress from the air lock space 25 by personnel without having to open any of the leafs 60A-D. The door 64 is releasably retained closed by a latch 66. The man door is not connected to control system.

In order to establish a prima facie case of obviousness based on a combination of prior art references under §103(a), an examiner must set forth some suggestion or motivation to combine the teachings of the prior art references, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art at the time of the invention. MPEP § 706.02(j). If there is no suggestion or motivation for the combination of references used to reject a claim, a reviewing court will infer that the references were selected with the assistance of hindsight. In re Rouffet, 149 F.3d 1350, 1358, 47 U.S.P.Q.2d 1453 (Fed. Cir. 1998). The use of hindsight in selecting references for combination in a §103(a) rejection is forbidden. Id. Further justification for the requirement to

provide some suggestion or motivation to combine prior art references is that virtually all inventions are combinations of old elements. Environmental Designs, Ltd. v. Union Oil Co., 713 F.2d 693, 698, 219 U.S.P.Q. 865 (Fed. Cir. 1983), cert. denied 464 U.S. 1043. Thus, if identification of each claimed element in the prior art were sufficient to negate patentability, very few patents would ever issue. Id. Without the requirement to show some suggestion or motivation to combine references, an examiner could use the claimed invention itself as a blueprint for piecing together elements in the prior art to defeat patentability of the invention. Rouffet at 1357.

In this case, there is no suggestion or motivation to combine Gallear and Kennedy. Gallear relates to a mine door control system operable to equalize the pressure between sets of doors to thereby prevent potential injuries caused by doors on the high pressure side being opened while someone is passing through the doors on the adjacent low pressure side and thereby causing the doors mounted on the low pressure side to slam shut. Kennedy teaches man doors for allowing personnel to pass through the mine door system without opening the mine door leafs and thus, without activating the control system. There is no motivation or suggestion to add the man doors taught by Kennedy to the mine door system of Gallear since doing so would circumvent the control system teachings of Gallear, i.e., that the doors in the mine door system should be controlled so that the doors of adjacent sets of doors cannot be opened simultaneously. Gallear therefore does not contemplate the addition of a manually operable man door. Indeed, Gallear teaches away from mounting a door, such as the Kennedy man door, that is independent of the control system. A prior art reference must be considered in its entirety, i.e. as a whole, including portions that would lead away from the claimed invention. MPEP 2141.02

Accordingly, Applicants respectfully request that the rejection of claim 19 under §103(a) based on the combination of Gallear and Kennedy be withdrawn.

Claim 20 depends directly from claim 19 and is submitted to be patentable over the references of record for the same reasons.

CLAIM 21

Claim 21 as amended is directed to a mine stopping system forming an airlock space in a mine passageway. The mine stopping system comprises:

a plurality of stoppings mounted in the passageway in spaced apart relation, said stoppings forming an airlock with an airlock space therebetween,

each stopping including a door leaf mounted for moving between open and closed positions,

at least one of said stoppings including a pressure relief opening therein and a closure mounted adjacent the opening for moving between a closed position for closing the pressure relief opening and an open position for relieving air pressure against the leaf to facilitate opening or closing of the leaf, and

a first actuator mounted adjacent said closure for moving said closure between the open position and the closed position.

To the extent amended claim 21 corresponds to claim 1, it is submitted as patentable for the same reasons as claim 1. Claims 22-24 depend directly or indirectly from claim 21 and are submitted to be patentable over the references of record for the same reasons as claim 21.

NEW CLAIMS 25-36

New claim 25 is submitted to be patentable in that the claimed combination of elements is not shown or suggested by the prior art. Particularly, the prior art fails to teach or suggest a mine door having a power-operated closure being movable from a closed position to an open position against pressures up to a first maximum pressure differential, and a power-operated leaf being moveable from a closed position to an open position against pressures up to a second maximum pressure differential, the second maximum pressure differential being less than the first

maximum pressure differential. Dependent claims 26-30 are also submitted as patentable.

New claim 31 is submitted to be patentable in that the claimed combination of elements is not shown or suggested by the prior art. Particularly, the prior art fails to teach or suggest a mine door having an actuator mounted to the second face of the leaf such that when the leaf is in the closed position the second actuator is not subjected to the higher pressure. In some mine environments, like coal mines, combustible gases (e.g., methane) may be present and particularly, on the high pressure side of the door. Thus, mounting equipment on the high pressure side of the door increases the fire hazard by having more potential ignition sources. Accordingly, applicants' claimed construction includes advantages not shown or suggested by the prior art. Dependent claim 32 is also submitted as patentable.

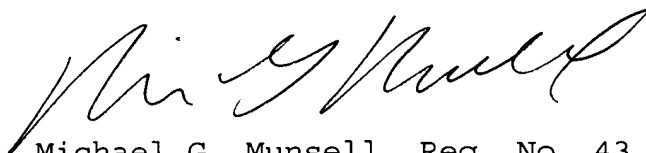
New claim 33 is submitted to be patentable in that the claimed combination of elements is not shown or suggested by the prior art. Particularly, the prior art fails to teach or suggest a mine door having a switch for simultaneously activating the power-operated leaf and the power-operated closure. The power-operated leaf and power-operated closure are simultaneously activated by a single valve, which provides substantially equal air pressure to the actuators of the closure and the leaf. If there is a significant air pressure against the doors, the power-operated closure will open prior to the power-operated leafs due to the fact that the ratio of the piston area of the relief door cylinder to the relief door area is much less than the ratio of the piston area of the leaf cylinder to the leaf area. Thus, the rate at which the door leaf opens is directly dependent on the amount of pressure against the front face of the leaf. As a result, the amount of time between when the doors are activated and the doors are opened is minimized. This advantage is not shown or suggested by the prior art. Dependent claims 34-35 are also submitted as patentable.

CONCLUSION

* A fee and check transmittal in the amount of \$462.00 are enclosed for payment of the additional claims fee.

In view of the foregoing, allowance of the application is respectfully required. The undersigned requests a telephone call from the Examiner if this would expedite allowance of the application.

Respectfully submitted,



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